Delivering information you can trust
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IBM Information Management software

IBM Information Integration Solutions for the Healthcare Industry

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Healthcare, one of the fastest growing industries in the world, faces difficult new challenges in today's environment of rapid and continuous change. Many healthcare organizations are being pushed to a crisis stage, fueled by unrelenting pressures related to cost, quality and access to relevant information. Global financial competition is limiting government and employer spending on healthcare, and healthcare delivery is shifting away from local to regional, national and international settings. As consumers begin to bear greater financial burden, they demand more and better healthcare services as they become more knowledgeable about the risks posed by healthcare. Although many healthcare organizations have reduced administrative costs and improved operational efficiencies and quality care, further improvement is needed to meet increasing regulatory requirements, shareholder objectives and consumer expectations about quality and consistency of care.

An increasingly aging and overweight population and drug-resistant infectious diseases pose further challenges for the healthcare industry. Today, people over the age of 60 outnumber those under 4, and overweight individuals outnumber those who are underweight. Chronic diseases account for 60 percent of deaths globally and consume 75 percent of resources in developed countries.[1] Grabbing headlines, infectious diseases such as influenza have reemerged, often in drug-resistant forms.

Healthcare organizations can address these challenges through innovation—but they must begin building the appropriate technology foundations now. New processes and techniques will lead to unprecedented advances in patient-centric healthcare management and delivery. Medical technologies such as genomics and regenerative medicine promise to revolutionize risk assessment, diagnosis and treatments—but advanced information management systems are necessary to take advantage of these breakthrough medical technologies.

Regulatory and financial pressures push healthcare organizations to use information more effectively

Healthcare organizations face increased regulatory and financial challenges. Demanding regulations mean that healthcare organizations may now face stiff penalties if they cannot produce information that is timely, complete and accurate from any system within the organization.

Escalating regulatory requirements and rising healthcare costs require organizations to focus on an integrated enterprise view of clinical, financial and administrative data. This view enables decision makers to monitor and stem runaway costs caused by a combination of thin operating margins, rising accounts receivable, bad debts and rising claims. Ironically, high costs do not translate to better patient care. For example, the United States spends more on healthcare than any other country in the Organization for Economic Cooperation and Development (OECD),[2] a group of 30 democratic and developed countries with free market economies. The U.S. spends 48 percent more than Norway, the second-highest spender, and 2.3 times the OECD average. Despite these expenditures, medical errors and inadequate care result in significant mortality, and 45 million Americans remain uninsured.

The trend toward mergers and acquisitions also puts pressure on healthcare organizations to integrate combined information resources more effectively. While mergers and acquisitions have created efficiencies, they also have created additional silos of information in an already crowded enterprise information infrastructure. As organizations become larger and more complex, they must constantly reevaluate whether they are using resources and information effectively. At the same time, they must maintain their credit ratings and access to capital while also containing medical and administrative costs and coping with increased competition. What is needed is a flexible, consolidated information structure that can serve as a foundation for the critical analytics necessary to compete as the market evolves.

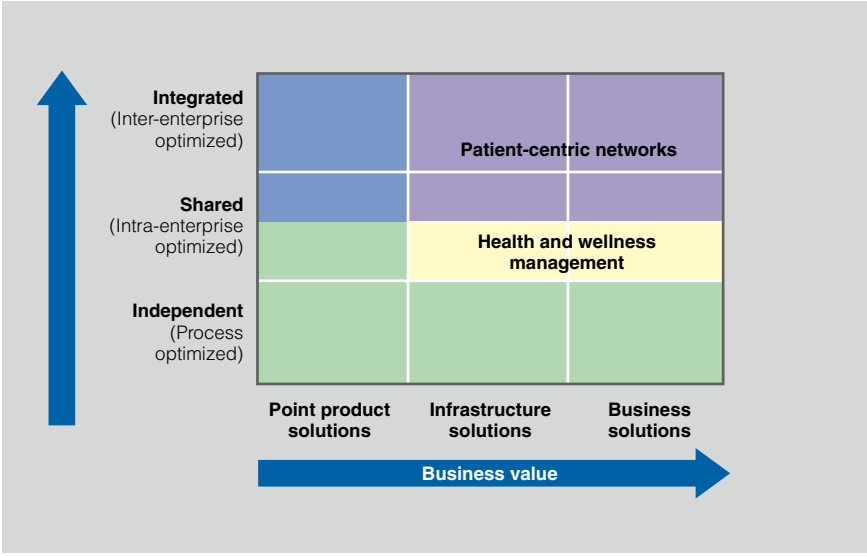
Patient-centric healthcare demands timely, personalized information from many sources

In addition to regulatory and financial challenges, healthcare organizations are adapting to new realities in patient care. Cost of care, financial accountability and decision making are shifting to the consumer, and employers and governments are pushing for health plans and providers to disclose the price of services and quality of care—information that consumers need to be accountable for their own healthcare. Medical technologies and the data created from these technologies have become highly personalized, requiring data systems to be restructured around individuals—to provide them with information in the context that they want it, when they want it.

Complexity of care has increased. Multiple care providers per patient are now the norm. Clinicians and results from numerous laboratory, pathology, surgical and radiology groups provide insight for decisions regarding patient-centric care. Data from these care providers must be accessible, trusted and actionable for a single view to enable quality care and to manage costs.

Many healthcare organizations realize that adopting patient-centric strategies (see Figure 1) that encompass plan members, healthcare providers, plan sponsors, payers and brokers will help them to realize reduced benefit and premium costs, and increased savings and quality. These patient-centric strategies will also enable them to improve administrative processes, while providing members with high-quality healthcare services. In this model, clinicians can leverage technology-enabled tools—such as electronic health records or clinical decision support—at the point of care. This environment creates the opportunity for healthcare organizations to improve the management of clinical, administrative and financial information around patients to produce a more holistic solution for patients and enhanced system efficiency.

Figure 1: Moving toward patient centricity



Business challenges create technology challenges

New opportunities to excel in patient-centric healthcare are rapidly emerging, and with them the demand on computing infrastructures has increased tremendously. For example, payers need flexible administrative systems so they can roll out health savings accounts (HSAs) and other innovative consumer-directed plans on demand. But flexibility is only part of the requirement. Like many others in the healthcare ecosystem, payers need to initiate new alliances that cross traditional industry boundaries while also ensuring that the exchange of information is robust, reliable and secure.

Likewise, providers and public health organizations acknowledge that, to deliver the best possible care, they must be able to share and access vast quantities of information—both internally and externally. This information may include clinical data, lab results, medical images, environmental data or genetic and molecular research on the rapidly shifting frontier of information-based medicine.

To meet these imperatives, healthcare organizations need consistent, timely access to authoritative and complete information about every facet of their business. Faced with the dual pressures of increased regulation and cost restrictions, many healthcare organizations are beginning to realize their core IT systems are insufficient to meet their information integration needs. They need systems that can create business value by integrating, optimizing and analyzing heterogeneous types of information assets in a more flexible and responsive manner.

Access to information on demand requires a business and technology environment that provides highly secure, scalable and reliable access across different networks and protocols from various devices. Today, information typically resides in application silos scattered throughout the enterprise, which results in:

- *Inconsistent view of patients, providers and data, resulting in multiple versions of the truth*
- *Information across business units and locally driven information which may not reflect organizational objectives or standards*
- *Poor channel communication*
- *Lack of standard business terms, definitions and taxonomies requiring custom-coded connectivity*
- *Poor discipline in how information is requested, presented and used*
- *Short-term, "quick fix" solutions that become long-term legacy systems*

However, this situation is neither inevitable nor irreversible. Virtually all of the information needed by healthcare organizations already exists somewhere within the organization. The trick is simply to find key data and manage it effectively.

Effective information management: A key competitive advantage in healthcare

Comprehensive information management is no longer a luxury—it is fundamental to the success and growth of healthcare businesses worldwide. More than 60 percent of CEOs and line of business executives say quality information is their top priority for improving business processes, employee productivity and customer or patient satisfaction.

By managing information assets effectively, healthcare organizations can optimize administrative processes, improve effectiveness and efficiency of care, and provide a foundation for future innovation. Optimized processes can help improve service levels, reduce costs, prevent fraud, streamline and automate back-office processes such as claims administration and billing, eliminate information silos, mitigate risk and simplify patient care programs. Outstanding information management helps improve care management, coordination and delivery by getting the right information to the right person at the right time. Additionally, it can help enable accelerated and adaptive new product introduction. Well-designed systems that are optimized for flexibility and reuse also help establish the capability to deliver new products and services without having to "rip and replace" existing environments.

Providers and payers typically have vast stores of data housed in multiple systems across the organization. Nearly 80 percent of organizations have two or more data repositories, and one in four firms has more than 15 data repositories. The average US$1 billion company operates no fewer than 48 disparate financial systems and 2.7 enterprise resource planning (ERP) systems.[3] However, because these systems often exist as independent silos, companies can face difficulty in extracting information that is consistent, accurate and timely. For example, according to a February 2006 CDI Institute survey of 50 Global 5000 IT organizations, a full 79 percent of CIOs say there is redundancy in their customer or patient data across the enterprise.[4]

Corporate executives understand the extent of the problem. In a recent IBM CEO study, 66 percent of those surveyed indicate that poor information quality has negatively affected the profitability of their company as a whole; 75 percent indicate bad data quality is harming service, quality and loyalty; and 52 percent identified integration of diverse systems as a major source of inaccurate information.[5]

Effective information integration: The foundation for patient-centric healthcare

Healthcare organizations that address these challenges by integrating key systems and managing information effectively can gain a competitive advantage. By creating a "single view of the truth" across disparate systems, providers and payers can dramatically streamline analysis, care and product development processes. A 360-degree view of the patient helps transform care, and real-time information analysis can speed delivery of appropriate programs. This technology-driven delivery can enhance efficiency and also help healthcare organizations reduce costs—and organizations skilled at identifying and deploying key technologies have a sustainable competitive edge because they can defend their market share amidst increasing competition.

Unlike inflexible point-to-point integrations that can inhibit growth and adaptability, an integrated information management approach allows healthcare organizations to achieve several important benefits. Providers can improve the quality and safety of care, improve patient satisfaction, enhance operational efficiency and cost-effectively comply with government regulations while reducing the cost to maintain their information infrastructure. Health plans help boost growth and profits, comply with government regulations, respond to consumer pressure for more choices and accelerate claims processing while addressing employers' objectives for health and wellness solutions.

IBM helps healthcare organizations use information effectively through Information on Demand

IBM offers a unique portfolio of solutions to help overcome the challenges of data integration and enable the delivery of information on demand. These solutions are designed to integrate information across the extended enterprise to support a single, consistent view of the patient, common semantics across the provider organization and an indisputable definition of master data. Delivered when the business user needs it, this information helps enrich business processes, enables key contextual insights and inspires confident business decision making. By adopting this information management approach, healthcare organizations can achieve the benefits outlined above.

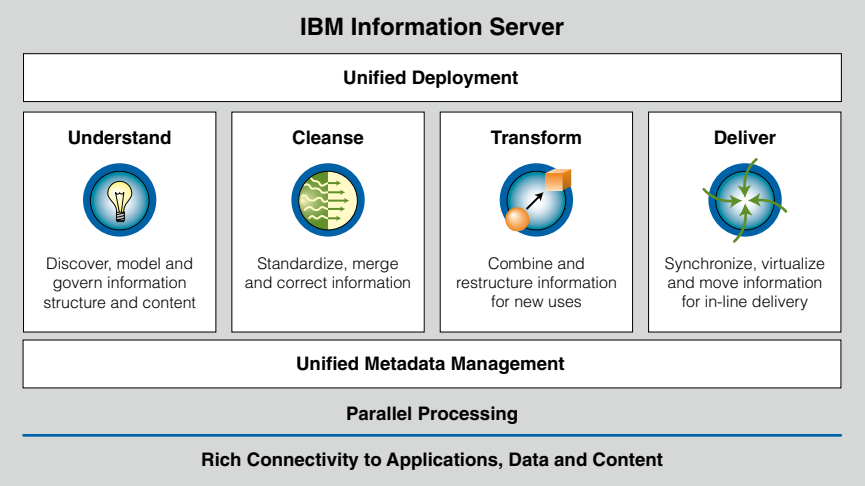
The IBM Information on Demand approach enables healthcare organizations to get the right information to the right people or processes at the right time to address the most critical business and healthcare issues. An effective information integration platform offers five fundamental capabilities:

- *The ability to connect to all relevant sources of information, whether structured or unstructured, mainframe or distributed, internal or external*
- *The ability to understand the content, quality and structure of the data sources prior to integration*
- *The ability to standardize and cleanse the data to provide a consistent view of any element of aftermarket product or pricing information*
- *The ability to effectively and efficiently collect, transform and enrich the high volume of data from source to target in a timely manner*
- *The ability to federate information, enabling applications to access and integrate diverse data and content as if it were a single source—without actually moving or copying the source data*

IBM® Information Server can help healthcare organizations improve data quality, maximize the business value of information and expand the accessibility of consistent, complete and authoritative information throughout the organization. As IT organizations look to Service Oriented Architecture (SOA) to improve flexibility and adopt a more standards-based approach to their IT infrastructure, this platform provides a fundamental building block for those SOA initiatives, providing reusable information services that span heterogeneous sources. Information is one of the key entry points for SOA—whether healthcare organizations need to service-enable mainframe data, provide reusable services around content repositories and other unstructured data sources, provide services to manage critical master data elements, manage XML messages in their pure form or share patient care records between doctors and across heterogeneous systems.

By making consistent, complete information accessible across the enterprise in a timely manner, an SOA and IBM Information Server can help payers and providers address compliance issues and manage transactional data. Integrating and consolidating complex operations helps deliver a single, high-quality view of patients and subscribers and facilitates collaboration with partners using industry standards (see Figure 2).

Figure 2: IBM Information Server helps leverage information from many data sources



Find and understand key data

IBM Information Server is a revolutionary new software platform that can help healthcare organizations derive more value from the complex, heterogeneous information spread across their systems. It enables payers and providers to deliver trusted information wherever and whenever needed, in line and in context, to specific people, applications and processes. It provides breakthrough productivity and performance for cleansing, transforming and delivering this information consistently and securely throughout the enterprise, so it can be accessed and used in new ways to help drive innovation, increase operational efficiency and lower risk.

The IBM Information Server advantage

- *A comprehensive, unified foundation for enterprise information architectures, scalable to any volume and processing requirement*
- *Auditable data quality as a foundation for trusted information across the enterprise*
- *Metadata-driven integration, providing breakthrough productivity and flexibility for integrating and enriching information*
- *Consistent, reusable information services—along with application services and process services*
- *Accelerated time to value with proven, industry-aligned solutions and expertise*
- *Very broad and deep connectivity to information across diverse sources: structured, unstructured, mainframe and applications*

Underlying these functions is a common connectivity, metadata and parallel processing infrastructure that provides leverage and automation across the platform. Each product module in the platform provides connections to many data and content sources and the ability to deliver information through a variety of mechanisms. By leveraging an SOA to publish consistent, reusable services for information, healthcare organizations can make it easier for processes to get the information they need from across a heterogeneous IT environment.

With traditional siloed environments, providers and payers may find it difficult to answer even very simple questions, such as where patient information resides, what care has been provided by their physicians and whether that information is correct. To help healthcare organizations understand the information already stored within their systems, IBM Information Server utilizes metadata-driven integration to enable clear and consistent understanding of the information itself as well as its relationship to other data sources. IBM Information Server takes a three-pronged approach to metadata:

1. *Through data-centric profiling and analysis of source systems,* ***IBM WebSphere® Information Analyzer*** *(a product module within IBM Information Server) helps automate detailed, physical profiling of the data in each column and table. By providing insight into the quality and usage characteristics of the information, WebSphere Information Analyzer helps uncover data relationships across systems through foreign key affinity mapping. This type of profiling is designed to become an ongoing process, allowing companies to establish a baseline analysis of data quality and continually measure against it to understand how data quality changes over time.*

   As part of this profiling process, a metadata map of source systems is created to reflect the actual data content and relationships. This metadata map is stored in ***IBM WebSphere Metadata Server****, the metadata repository within IBM Information Server, provides a baseline for current and future products. It also helps reduce development time dramatically by enabling developers to find relevant data stores quickly.*

2. *Business metadata is recorded in **IBM WebSphere Business Glossary** (a product module of IBM Information Server), which provides a Web-based tool for authoring, managing and sharing business metadata. This tool is designed for business users and subject-matter experts to define data stewards and record business terminology definitions and taxonomies.*

   For example, multiple systems may maintain tables of patient information. However, the organization may uncover a requirement for the concept of a critical care patient. The provider needs a way to define patients that require extra attention and procedures for treating those patients more quickly or extensively. WebSphere Business Glossary serves as a tool to record these definitions and relate business concepts together into taxonomies. In turn, the physical metadata created by WebSphere Information Analyzer can then be mapped and reconciled with these business definitions. In this manner, the tool records the business requirements, the profiling and analysis results are mapped to them in a common metadata repository, and both business and technical teams understand how they need to integrate the data to improve patient care.

3. *When database administrators and data architects perform physical data modeling, they actually define the future state of the data. **IBM Rational® Data Architect** feeds this metadata into a shared repository. This tool not only provides strong logical and physical data modeling capabilities, but it also provides facilities to map across models and automatically discover relationships.*

Because employees in multiple roles are typically involved in development projects, WebSphere Metadata Server automates management of metadata across these roles and functions. As each role creates new metadata, that metadata becomes immediately available to others working on the project in different product modules of IBM Information Server—helping to dramatically reduce the time between specification and build, and shorten overall project cycle times. The metadata can also shorten the time it takes to design integration logic and sometimes even to automate the creation of code. It creates an ongoing record of shared understanding that carries forward to future projects. The metadata itself becomes an asset that improves the overall understanding of the business and allows projects to be executed more efficiently in the future.

Standardize and cleanse data for consistent information

Once healthcare organizations identify and map sources of critical data throughout the enterprise, they must evaluate the quality of that data. Slow, continuous degradation can cause data to become outdated or inconsistent, and therefore, no longer trustworthy. For healthcare organizations, the misrepresentation of incomplete, inaccurate or inconsistent patient and treatment information may lead to misdiagnoses, inappropriate care or even death.

Data cleansing is the process of repairing this inevitable degradation. Within IBM Information Server, the IBM WebSphere QualityStage™ product module helps to identify and resolve data quality issues through an easy-to-use graphical flow diagram. This module allows data quality processes to be embedded in any information integration process. With WebSphere QualityStage, healthcare organizations can:

- *Perform free-form text investigation, allowing administrators to recognize and parse out individual fields of data from free-form text*
- *Standardize and correct individual data fields according to company-wide standards*
- *Use postal information to standardize, validate and enrich address data*
- *Remove duplicate data from individual sources through matching processes to create a single view of each patient*
- *Identify and link common records across sources*
- *Merge the best data from across different systems into a consolidated patient record*
- *Define complex matching and survivorship logic using visual tools*
- *Enable a single version of the truth*

The true power of WebSphere QualityStage is its ability to match data from different records, even when that data appears very different. These match rules, designed using a user-friendly visual interface, provide instant feedback on match rule changes to allow the rules to be fine-tuned quickly and easily. Because of this ability to match records, WebSphere QualityStage is a key enabler of creating a single view of patients—which helps providers make fast, appropriate and accurate care decisions, facilitates lower costs by reducing the risk of mistakes and helps improve patient satisfaction with their care.

IBM Information Server: Data quality at work

When a family of nonprofit healthcare organizations in the Midwest needed to replace its tools for maintaining its existing data warehouse and to build new datamarts, the organization chose to build an enterprise data warehouse based on the IBM Information Server integration platform. The new solution collects metadata, business rules and logic to design, create, deploy, load and maintain datamarts from this base data warehouse, as well as from other data sources in the organization. As this information flows between the datamarts and the data warehouse, data quality services maintain and enrich information to help ensure its consistency and accuracy. Today, the organization designs, builds, deploys and supports datamarts quickly and easily from the existing data warehouse and keeps those datamarts synchronized with the data warehouse.

Quickly transform and enrich high volumes of data

By allowing healthcare organizations to transform and aggregate any volume of information in batch or real time through visually designed logic, IBM WebSphere DataStage (a product module of IBM Information Server) facilitates codeless visual design of data flows with hundreds of built-in transformation functions. It helps optimize the reuse of data integration objects, allowing administrators to leverage information services for consistent access to all relevant data sources. It also is capable of supporting large and complex volumes of information for batch, real-time and event-based modes of information integration by leveraging parallel processing capabilities.

IBM Information Server: Data transformation at work

When a trade association for a group of independent, locally operated health plans needed to produce key business metrics across all affiliates in key areas (such as service costs, subscriber renewal rates and profitability, provider costs and healthcare outcomes), it was thwarted by its inability to easily and flexibly integrate, align, enhance and modify reporting data provided from affiliates. Without an understanding of or confidence in source data systems, the association was forced to limit its analytical efforts and the reports it could offer back to its affiliate partners.

By implementing a solution based on IBM WebSphere DataStage MVS® Edition software, the association was able to standardize its format and process for integrating data across all 40 of its affiliate companies. The software helped the organization eliminate source system differences (IBM IMS™, VSAM or IBM DB2®)—improving data quality and reducing IT overhead associated with generating comparative performance metrics.

Federate information for seamless business intelligence

Once data has been identified and cleansed, IBM WebSphere Federation Server (a product module of IBM Information Server) enables healthcare organizations to access and integrate heterogeneous information across multiple sources as if they were a single source. For example, care providers might combine patient historical data, physician notes, radiology images and prescription information using a Web-based interface so doctors across the organization have a full view of the patient before administering treatment. Federated information could also enable patients to access their records, review treatment information and check billing information through a self-service Web-based portal, thereby improving satisfaction that the care provider and insurance company are meeting the patient's needs. In a payer setting, federated information management might translate into giving claims representatives the ability to access patient records as calls come in and allowing them to recommend potential approaches to care in the context of the individual patient's situation.

IBM offers a complete range of Information on Demand solutions for healthcare

As the challenges of a global business environment push healthcare organizations to adapt more quickly and assume more risk than ever before, it is critical that these organizations use all the resources at their disposal to gain a competitive edge, to deliver more accurate and appropriate care, and to improve the levels of satisfaction and well-being of their patients and constituents.

IBM offers a broad range of expertise and industry insight to help guide organizations through the process. Through the IBM Information On Demand Center of Excellence, companies work with experts from across IBM to develop the critical competencies that are necessary to move along the road to Information on Demand. The Center of Excellence is staffed with solution architects, information architects and researchers from across IBM Business Consulting Services, IBM Software Group and IBM Research. These experts are available to assist healthcare organizations with thought leadership, solution development and client support, and competency development.

Information integration services from IBM Global Business Services and Global Technology Services also complement the IBM Information Server platform. Designed to help ensure client success with IBM solutions and streamline technology implementations, IBM Information Integration Services range from technical support to education to professional services. Available for a specific segment of your project or on an end-to-end implementation basis, these services help produce rapid results—putting healthcare information management projects on the road to success.

IBM Global Business Services at work

When a major insurance company's existing data environment, consisting of Oracle and DB2 databases, made it impossible to determine which products existing customers already had, executives knew the organization needed an information integration solution that would allow it to further penetrate its existing customer base and position it to attract new business.

The insurer engaged IBM Software Services for Information Management (ISSIM) to install IBM Information Server as an extract, transform, and load (ETL) solution to integrate and transform its enterprise data. IBM created a central data warehouse for the company's disparate customer information, providing it with a single, integrated information source to fuel business plans and marketing campaigns. IBM also conducted two training sessions—basic and advanced—of four days each and provided 120 hours of consulting services to help get the company started with its new information integration solution.

With the customer categorization capabilities enabled by the new IBM information integration architecture, the company has been able to create and market products for specific user groups, thereby penetrating its existing customer base and appealing to new markets more effectively. The insurer now leverages the increased visibility into customer data to create customized marketing campaigns, take advantage of cross-selling opportunities and target appropriate audiences with direct mailings.

For more information

To learn more about IBM Information Integration Solutions, contact an IBM representative or visit **ibm.com**/software/data/integration

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